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Enhancing Patient Care Through Preparing an AI Expertise in Libya: A Postgraduate Program on AI in Healthcare

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ABSTRACT

The Libyan healthcare system is struggling with many problems, like a short workforce, limited access to care, and fewer resources to run the hospitals and medical canters. In Libya, these challenges are more due to the increased demand for quality services and the city's population. Aims: Thus, there is an urgent need for quick solutions like Artificial Intelligence (AI) tools and resources that may help to increase healthcare productivity by managing ongoing issues like hospital waiting time and patient schedules and more help with operational management through appropriate workforce allocations. Objectives: To start using AI tools, the study will focus on the importance of training healthcare professionals through a post-graduate degree to ensure a proper understanding of how AI is implemented in healthcare and how to manage its challenges. A mixed research qualitative approach searching on the Google engine and the National Institution of Health (NIH) website and a comprehensive class curriculum was searched based on the international benchmarks that teach a master's degree in AI healthcare. A master's degree program was prepared to target newly graduated professionals focusing on three core areas: medical practice issues, technology applications, and AI model projects. There is an urgent need in Libya for a postgraduate program to prepare professionals to be experts in using AI in healthcare. The postgraduate degree is expected to help healthcare professionals improve patient care, mainly when adapting AI-dependent health services.

Keywords: Artificial Intelligence in Healthcare, Libya hospitals, Libyan Healthcare, Challenges.

تعزيز رعاية المرضى من خلال إعداد خبراء في الذكاء الاصطناعي في ليبيا: برنامج الدراسات العليا في الذكاء الاصطناعي والرعاية الصحية

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ملخـــــص البحـــــث

يواجه نظام الرعاية الصحية الليبي من العديد من المشاكل، مثل نقص القوى العاملة، ومحدودية الوصول إلى الرعاية وقلة الموارد اللازمة لتشغيل المستشفيات والمراكز الطبية. في ليبيا، ترجع هذه التحديات بشكل أكبر إلى زيادة الطلب على الخدمات عالية الجودة وكثافة سكان المدينة، فكانت الأهداف إيجاد حلول سريعة مثل أدوات وموارد الذكاء الاصطناعي التي قد تساعد في زيادة إنتاجية الرعاية الصحية من خلال إدارة المشكلات المستمرة مثل وقت انتظار المستشفيات وجداول المرضى والمزيد من المساعدة في الإدارة التشغيلية من خلال تخصيص القوى العاملة المناسبة، و للبدء في استخدام أدوات الذكاء الاصطناعي، ستركز الدراسة على أهمية تدريب المتخصصين في الرعاية الصحية من خلال درجة

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الدراسات العليا لضمان فهم سليم لكيفية تطبيق الذكاء الاصطناعي في الرعاية الصحية وكيفية إدارة تحدياته. تم البحث في منهج بحثي نوعي مختلط من خلال البحث على محرك البحث جوجل وموقع المعهد الوطني للصحة (NIH) ومنهج دراسي شامل بناءً على المعايير الدولية التي تدرس درجة الماجستير في الرعاية الصحية القائمة على الذكاء الاصطناعي. تم إعداد برنامج درجة الماجستير لاستهداف المهنيين حديثي التخرج مع التركيز على ثلاثة مجالات أساسية: قضايا الممارسة الطبية، وتطبيقات التكنولوجيا، ومشاريع نموذج الذكاء الاصطناعي. وبينت النتائج أن هناك حاجة ماسة في ليبيا لبرنامج دراسات عليا لإعداد متخصصين ليكونوا خبراء في استخدام الذكاء الاصطناعي في الرعاية الصحية. ومن المتوقع أن يساعد هذا البرنامج المتخصصين في الرعاية الصحية على تحسين رعاية المرضى، لا سيما عند تكييف الخدمات الصحية المعتمدة على الذكاء الاصطناعي.

الكلمات الدالة: الذكاء الاصطناعي في الرعاية الصحية، مستشفيات ليبيا، الرعاية الصحية الليبية، التحديات.

1. INTRODUCTION

1.1 *Libyan's Healthcare Challenges*

The Libyan Healthcare system has suffered a lot for a long time due to insufficient funds by the government, the recent war conflict, and the last pandemic. Each region in Libya has specific healthcare challanges. A big city with more population struggled with short workforces and limited resources, while rural areas and small towns struggled more with a lack of access to care and increased risk of communicable diseases from unvaccinated immigrants [1]. Based on the World Health Organization (WHO) (https://applications.emro.who.int/docs/9789292742584-eng.pdf) annual report in 2023 stated that Libya has only 1.5 healthcare workers per 1,000 population, which is less than the international recommendations for the healthcare workforce. The healthcare services in Libya are dealing with ongoing challenges that have impacted the capacity of the healthcare system to provide quality care to the citizens. These challenges ranged from some unoperated hospitals, limited bed capacities, short workforces, mainly nurses, and shortages of medical equipment and drug supplies. The Libyan healthcare system's existing problem may benefit from the innovation that is provided by AI software in health. There are many hospitals are running short of workers and unable to admit more patients due to a shortage of beds. Using AI to manage operational tasks like detecting inventory and medical supplies shortages and managing patient data like billing claims and hospital administrative work. AI shows promise in helping manage patient flow by scheduling patient visits and optimizing doctors' time [2]. Many published researches prove that AI has significant benefits in improving the quality of care. A study stated that using AI tools may improve the patient's diagnosis and treatments by helping doctors reach accurate diagnoses quickly and also request less unnecessary investigation that may cost patients more for the care [3].

1.2 *Objectives and Scope of The Research.*

The study focuses on the need to train healthcare professionals in Libya on how to use AI technology and new medical software to improve the quality of care. The research will discuss the role of a postgraduate degree in AI health to prepare the healthcare providers dealing with the use of AI models and address the AI challenging.

2. LITERATURE REVIEW

2.1 *AI Solutions in Healthcare*

Using new technology like AI models in healthcare may be able to solve existing problems, such as reducing the cost of care and administrative costs at hospitals. [4] The fundamental shift of AI in health is helping personalized patient care through Genomics, where early cancer diagnosis and prediction are now achieved through analyzing AI algorithms for patients' genetic mutations [5] .Another way where AI and medical software aid a significant

transformation is Telehealth and doctor-patient communication through chatbots and assistant chat response. AI helps patients access care, seek health advice, and get a response in a short time[6] The AI tools that use predictive data may help doctors focus more on patients at high risk of getting the disease and provide them with the right treatment plan that helps to prevent the disease or decrease morbidity[7]

2.2 *The Challenges in Adopting AI*

Adapting the new technology in developing countries' healthcare systems needs a lot of resource support. In Libya, the healthcare system is not ready and suffers from limitations of infrastructure that are necessary for the working of technology, such as trained workforces and technology equipment. Although innovation in healthcare technology had been approved, it solved a lot of the most complicated healthcare issues like resource allocation, increased productivity, and improved quality of health. Yet, the Libyan health care system is struggling to adapt to the technology, and it is not a priority in many of the big hospitals in the country. A study revealed that many barriers prevent appropriate AI implementation in healthcare, including the planning for how to use AI in health and continuing AI software maintenance [8]. The revolutionization of AI in health in a short time increased the ethical and legal concerns of how to control access to patients' data and prevent any security threats to patients' privacy and overall patient safety. The AI software needs regulatory control and to be ethically approved before being used for patient care. In addition, a doctor needs to be well-trained in how to use AI tools [9].

2.3 *Preparing Healthcare Professionals for the New AI Tools*

There is an urgent need to train healthcare providers to know how to use AI modules in daily work. Most of Libya's healthcare operation system is a paper-based system where physicians write the patients 'notices and paper prescriptions. There is a lack of infrastructure like computers and software and a lack of training on using them. on the quick emergence of AI tools in healthcare, there is an urgent need to start adapting these tools and need to train healthcare professionals on how to use them. A study showed that hospitals need to train healthcare providers on how to use AI tools as diagnostic aids [10]. Healthcare facilities use AI tools in daily operation tasks and for patient care. However, health professionals lack the knowledge of how to use the tools properly and need a clear guidance plan [11]. The majority of healthcare systems in developed countries started adopting AI health in universities and medical schools learning approaches by integrating into both the technology and the clinical sciences. At the University of Toronto, (https://mscac.utoronto.ca/concentrations/aih.) Canada, there is a postgraduate degree called Artificial Intelligence in Healthcare: Master of Science in Applied Computing, the program aims to help students understand and apply AI algorithms in the healthcare sectors.

3. MATERIALS AND METHODS

The study is a qualitative approach that has two main methods of searching the internet; the first step was by conducting research on the Google search engine and the National Institution of Health (NIH) website for the use of AI in healthcare, the search was only focused on the time frame from 2023 to 2024, using keywords as healthcare innovations, improving care with using AI, challanges of using AI. The selected articles that meet that criteria were analyzed and adapted for the study.

The second step of collecting data was using the Google search engine and looking for a master's degree in AI in healthcare.

, The results were collected by selecting the best programs based on the university's ranking and students' feedback. Ten universities were selected as benchmarks to design the master's degree curriculum. The selected programs were evaluated through criteria like the class topics, the duration of the study, total credit, and future job opportunities for the graduates.

4. RESULTS AND DISCUSSION

4.1 *AI Training for Healthcare Professionals*

The research review found that more than 30 research papers published between 2023 and 2024 on the National Institution of Health (NIH) website have approved the benefits of using AI tools to improve patient care. Thus, there has been a shift to adapting AI tools in the daily work of healthcare providers by major healthcare systems in developed countries. There were some concerns regarding how far AI will be integrated into healthcare [12]. To adopt AI in health, the medical education curriculum may include AI tools in health and cover topics like machine learning and using of data, in addition to adding more about how to control using of AI and ethical considerations [13].

There are some challanges when it comes to applying AI in medical education, like condensed class topics and shortages of qualified professors. To overcome these barriers, there is an urgent need for collaboration between AI tech developers, practicing doctors, and medical academia [14].

4.2 *International Benchmarks for AI in Healthcare Education*

The study selected ten international benchmarkers to design the master's program University of Toronto, University of Alabama (https://www.uab.edu/degrees/graduate/ai-medicine.) at Birmingham, Cambridge Corporate, Columbia University (https://cambridgecu.ch/the-master-of. rtificial-intelligence-in-healthcare-manageme nt.) Johns Hopkins Biomedical Engineering (:https://www.bme.jhu.edu/academics/graduate/masters-programs/masters-program[/masters.), Michigan Technological University,(https://www.mtu.edu/gradschool/programs/certificates/ai-healthcare) Fordham University(https://www.fordham.edu/gabelli-school-of-business/academic-programs.), University of Texas (https://cdso.utexas.edu/msai) at Austin, Worcester Polytechnic Institute(https://www.wpi.edu/academics/study/artificial-intelligence) and University College London (https://www.ucl.ac.uk/prospective-students/graduate/taught-degrees/artificial-intelligence). The universities were selected based on their rank and the specialties in the technologies. Most universities have adapted the AI deep knowledge in the class curriculum. Students in these programs are required to design and deploy an AI module as the final graduation project. The University of Cambridge Corporate teaches a master's degree in AI in healthcare management, which is the university described as the only program worldwide where that focuses on managing healthcare using AI technology. Most of the programs have fundamental courses that introduce AI to technology and machine learning, followed by core courses that integrate healthcare in AI tools, the ethical and legal considerations of using AI in healthcare, and AI as a diagnostic tool. Finally, there are elective classes where students may choose the area that interests them. For students to earn the degree, they need to complete a graduation capstone like deploying an AI module.

4.3 *Importance of AI education in healthcare*.

The study focused on reviewing some postgraduate programs that provide a master's degree in AI healthcare. The program will be designed for students who are interested in applying AI in healthcare. The program will provide full-time and part-time options for learning. The curriculum will be designed to involve both technology knowledge of how AI works and integrated AI tools in healthcare, such as diagnostics of patient illness and personalized patient care. The proposed program will have three foundational courses, two core courses, two elective classes, and a graduation project.

4.4 *Limitations of the research and future directions.*

The research focuses on the challanges mainly in the Libya hospitals and cannot be generalized , so there is a need for the adoption of a broader

study for AI tool applications in health. The implementation of the postgraduate degree requires both financial and infrastructure resources, which are not available yet. The lack of AI health experts who will be designing the program curriculum or teaching is one of the challanges in adapting the program. The program relies heavily on the international universities' curriculum as a benchmark which will not align with the local health needs and culture.

5. CONCLUSIONS

Libyan healthcare institutions confront many obstacles, such as overloaded hospital capacities and shortages of workforce compared to international standards. Leading to delayed access to care and an increased rate of medical errors. These challenges open the door for urgent integrations to the adoption of AI tools that provide solutions for resolving those issues. Definitely, the quick evolution of AI in healthcare will change the way the Libyan healthcare system works in the way of providing care service, access to care, or optimization of the workforce. However, it demands continuous regulations and ethical control of how the AI will work. There is an urgent need to redesign the workforce to adopt the AI transformation by teaching and training healthcare providers to be able to handle the AI wave of change in healthcare. The postgraduate degree will provide prospective students with the necessary knowledge and hands-on training on how to understand AI in healthcare and design AI models that address local needs in solving current healthcare issues.

5.1 Recommendations

Based on the research findings, these are the proposed recommendations:

1- Develop a clear strategy for adapting and implementing AI tools in the Libyan healthcare system and improving Libya hospitals 'operations.

2- Provide AI tools training for healthcare professionals to help them understand the AI applications and challenges.

3- Proposed an AI postgrad education for healthcare providers to build a net of local AI expertise.

4- Collaborate with International Universities to exchange AI learning programs and resources.

The benefits of adopting these recommendations will improve patient quality of care in the Libyan Healthcare system and provide health professionals with the skills they need to address the upcoming health challenges.

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